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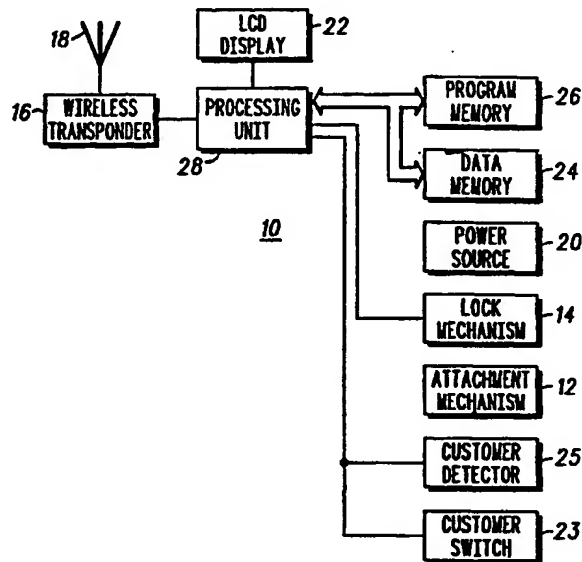
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(54) Title: ANTI-THEFT SHOPPING TAG WITH DISPLAY



(57) Abstract: An anti-theft shopping tag device for providing both anti-theft protection for a product and for displaying at least a price of a product. The anti-theft shopping tag device is attached to the product, preferably with a locking mechanism, and more preferably with a locking mechanism which opens automatically upon the receipt of an unlocking signal. The device can receive and automatically change the displayed price, for example for a sale or in response to the detection of the presence of a customer, for example by detecting the presence of a loyalty card. The anti-theft shopping tag device can also display advertisements. In addition, the anti-theft shopping tag device can be used for inventory control.

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## ANTI-THEFT SHOPPING TAG WITH DISPLAY

FIELD OF THE INVENTION

The present invention relates to an anti-theft shopping tag with  
5 display, and in particular to such a shopping tag which displays price tag  
and/or other types of information about the tagged product while also  
functioning as an anti-theft device, as well as to a system and method for  
using the tag.

BACKGROUND OF THE INVENTION

10 Theft of products is a significant problem for stores, particularly for  
those stores which sell relatively more expensive products such as clothing  
and electronic goods. Although stores rely upon a mixture of different  
security measures, one highly important security device is the anti-theft  
shopping tag. These tags, which are currently typically made from plastic,  
15 are attached to the product to be protected. Each tag features a wireless  
transponder, and may be active with an independent power source, or  
passive. Passive tags rely upon received transmissions for power. In either  
case, the presence of the tag is detected with a hand-held reader or an exit  
security gate, which either receive transmissions from active tags, or provide  
20 transmissions, and therefore power, to passive tags. If the presence of the tag  
is detected, typically an audible alarm is sounded, or other alarm indication is  
given, alerting store personnel to the potential theft of the product. The tag  
must be removed by store personnel after purchase by the customer to avoid  
such an alarm.

CONFIRMATION COPY

Currently, such anti-theft tags suffer from a number of drawbacks.

First, the tags which are known in the background art do not serve any function other than as an anti-theft device. Yet such tags are clearly visible to the customer when the product is examined before purchase, and must  
5 then be processed by sales personnel after the purchase. Indeed, the products are typically handled by sales personnel at least twice prior to being displayed for sale: once to install the anti-theft tag, and once to add a price tag to the product. Therefore, such products require two tags, installed in two separate operations. Furthermore, if the price on the price tag must be  
10 changed, for example during a sale or as a result of a change in tax regulations, then the sales personnel must manually the price change on each price tag, which is time consuming and tedious. Alternatively, the store may elect to indicate that a group of products is on sale with a reduction in price of a certain percentage, which is confusing to the customer.

15 In addition, removal of the tags is a manual operation, requiring intervention by sales personnel, and as such is time-consuming and inefficient. A more efficient mechanism for tag removal would be quick and automatic, and would therefore not require such a significant investment of time by the sales personnel.

20 Also, on less expensive products, such as foodstuffs, stores frequently do not install anti-theft tags, as the amount of time required to install and remove the tags is greater than the cost of the product. Such products may only be marked with a bar code, which is scanned at the time of purchase to

determine the price of the product. However, the customer cannot easily determine the price without a separate additional price tag on the product, which must be placed on the product separately. Thus, both existing price tags and anti-theft tags are clearly deficient.

5           A more useful solution would combine anti-theft protection with the ability to receive and to display price information and/or other information in a single tag for attachment to the product. Such a solution would preferably be inexpensive, such that the tag would be cost-effective for even inexpensive products such as foodstuffs. Furthermore, such a combined tag  
10       would preferably be able to be automatically updated, thereby reducing the intervention of store personnel with the tasks of adding pricing information to products. Unfortunately, such a solution is not currently available.

          Therefore, there is an unmet need for, and it would be highly useful to have, a shopping tag which combines anti-theft protection with a display for  
15       price information and/or other information about the product, such that the tag could automatically receive and display price and/or other information, while providing an anti-theft device for sounding an alarm and/or for performing another anti-theft action if an attempt is made to steal the product.

20

#### SUMMARY OF THE INVENTION

          The present invention is of an anti-theft shopping tag device for providing both anti-theft protection for a product and for displaying at least a

price of a product. The anti-theft shopping tag device is attached to the product, preferably with a locking mechanism, and more preferably with a locking mechanism which opens automatically upon the receipt of an unlocking signal. The device can receive and automatically change the  
5 displayed price, for example for a sale or in response to the detection of the presence of a customer, for example by detecting the presence of a loyalty card. The anti-theft shopping tag device can also display advertisements. In addition, the anti-theft shopping tag device can be used for inventory control.

According to the present invention, there is provided an anti-theft  
10 shopping tag device for indicating a presence of a product and for displaying information about the product, the shopping tag device comprising: (a) an attachment mechanism for attaching to the product; (b) an antenna for sending a signal indicating the presence of the product; (c) a low power display for displaying the product information; and (d) a processing unit for  
15 controlling the antenna and the low power display.

According to still another embodiment of the present invention, there is provided a anti-theft system for a product in a store, the system comprising: (a) an anti-theft shopping tag for indicating a presence of a product and for displaying information about the product, comprising: (i) an  
20 attachment mechanism for attaching to the product; (ii) an antenna for sending a signal indicating the presence of the product and for receiving a received signal containing the information about the product; (iii) a low power display for displaying the product information; and (iv) a processing

unit for controlling the antenna and the low power display; (b) an anti-theft detector for detecting the presence of the shopping tag device and for sounding an alarm; (c) a computer for determining at least the information about the product; and (d) a broadcast transmitter for transmitting at least the  
5 information about the product to the shopping tag device.

According to yet another embodiment of the present invention, there is provided a method for providing anti-theft protection for a product by an anti-theft detector and for displaying at least a price of a product with a single unit shopping tag device, the shopping tag device featuring a  
10 microprocessor, the method comprising the steps of: (a) receiving at least the price of the product by the shopping tag device; (b) displaying at least the price of the product by the shopping tag device; (c) detecting a presence of the shopping tag device by the anti-theft detector; (d) sounding an alarm by the anti-theft detector; and (e) changing at least the price of the product by  
15 sending a new price to the shopping tag device, such the new price is displayed automatically by the shopping tag device.

Hereinafter, the term "shopping tag" refers to any type of tag for attachment to a product or other physical, tangible goods, and is not limited to the application of such tags in a store environment.

20 Hereinafter, the term "computing platform" refers to a particular computer hardware system or to a particular software operating system. Examples of such hardware systems include, but are not limited to, personal computers (PC), palmtops, handheld computers, Macintosh™ computers,

mainframes, minicomputers, embedded systems with a data processor and workstations. Examples of such software operating systems include, but are not limited to, UNIX, VMS, Linux, MacOS™, DOS, one of the Windows™ operating systems by Microsoft Corp. (USA), such as Windows NT™, or  
5 Windows CE™, for example, as well as any suitable operating system for embedded units or palmtop/handheld type computers.

For the present invention, a software application could be written in substantially any suitable programming language, which could easily be selected by one of ordinary skill in the art. The programming language  
10 chosen should be compatible with the computing platform according to which the software application is executed. Examples of suitable programming languages include, but are not limited to, C, C++ and Java.

In addition, the functional features of the present invention could be implemented as software, firmware or hardware, or as a combination thereof.  
15 For any of these implementations, the functional steps performed by the method could be described as a plurality of instructions performed by a data processor, a specialized ASIC or FPGA (field programmable gate array), for example.

## 20 BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic block diagram illustrating an exemplary device according to the present invention;

FIG. 2A is a schematic block diagram illustrating an exemplary exterior for the device of Figure 1, while FIG. 2B is a schematic ~~block~~  
5 diagram of an exemplary automatic locking mechanism according to the present invention; and

FIG. 3 is a schematic block diagram illustrating an exemplary system according to the present invention.

## 10 DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is of an anti-theft shopping tag device for providing both anti-theft protection for a product and for displaying at least a price of a product. The anti-theft shopping tag device is attached to the product, preferably with a locking mechanism, and more preferably with a  
15 locking mechanism which opens automatically upon the receipt of an unlocking signal. The device can receive and automatically change the displayed price, for example for a sale or in response to the detection of the presence of a customer, for example by detecting the presence of a loyalty card. The anti-theft shopping tag device can also display advertisements. In  
20 addition, the anti-theft shopping tag device can be used for inventory control.

The principles and operation of the device, system and method according to the present invention may be better understood with reference to the drawings and the accompanying description.



Referring now to the drawings, Figure 1 is a schematic block diagram illustrating an exemplary device according to the present invention. A combined shopping tag 10 is shown. Shopping tag 10 features an attachment mechanism 12 for attachment to a product (not shown). As shown, preferably attachment mechanism 12 features a locking mechanism 14 for preventing the unauthorized removal of shopping tag 10 from the product (shown in greater detail in Figure 2 below). Attachment mechanism 12 may feature substantially any suitable technology for attaching shopping tag 10 to the product. For example, attachment mechanism 12 may optionally feature a glue or other chemical composition for attaching shopping tag 10. Alternatively and preferably, attachment mechanism 12 is a mechanical device, for example a rod or loop of plastic or other suitable material, which is inserted through the product and is then locked by locking mechanism 14.

Once shopping tag 10 has been attached to the product through attachment mechanism 12, shopping tag 10 is able to perform two different functions: anti-theft protection and the display of price or other information. The first function, anti-theft protection, is accomplished through a wireless transponder 16. Wireless transponder 16 at least receives signals from an antenna 18, and may also optionally and preferably transmit signals through antenna 18. When shopping tag 10 is brought into proximity with an anti-theft detector, such as a proximity reader of some type (not shown in Figure 1, shown as an anti-theft detector in Figure 3 below), antenna 18 receives a signal from the anti-theft detector. Wireless transponder 16 then emits a

signal through antenna 18 for detection by the anti-theft detector, indicating the proximity of shopping tag 10 in an area which is not permitted.

Alternatively and preferably, if shopping tag 10 optionally features an independent power source 20, then wireless transponder 16 actively ~~transmits~~ a signal, continuously, intermittently or upon receipt of a command, which is then received by the anti-theft detector.

The second function of shopping tag 10, that of automatically receiving and displaying price or other information about the product, also requires the activity of wireless transponder 16, antenna 18, and power source 20. In addition, shopping tag 10 features a low power display 22. Low power display 22 displays price or other information about the product to the customer. As described in greater detail below, depending upon the type of power source 20, low power display 22 may optionally display such information continuously or alternatively may display the information upon request by the customer, for example after operating a customer switch 23 on shopping tag 10. Customer switch 23 may also optionally be implemented as an automatic hand capacity detection switch in conjunction with an optional customer detector 25, for automatically causing low power display 22 to display such information when shopping tag 10 is held or touched by the customer. Also alternatively and preferably, low power display 22 may display the information after automatically sensing the proximity of the customer to shopping tag 10, for example.

The price information and/or other information about the product, is preferably stored in a data memory 24. Data memory 24 is preferably a writable and readable, non-volatile memory device, as described in greater detail below. Instructions for operating low power display 22, for receiving  
5 and processing data from wireless transponder 16, and optionally for processing data for transmission through wireless transponder 16, are preferably stored on a program memory 26. Program memory 26 is preferably at least a readable non-volatile memory device, and more preferably is both readable and writable. The instructions are executed by a  
10 processing unit 28, which may be any suitable type of microprocessor.

The operation of the information display function of shopping tag 10 is described in greater detail below with regard to Figure 3. Briefly, antenna 18 receives a signal from a computer equipped with a transmitter (not shown in Figure 1, see Figure 3 below). The signal contains the price and/or other  
15 information about the product. Wireless transponder 16 passes the signal to processing unit 28, which processes the received signal according to instructions contained in program memory 26 in order to extract the price and/or other information about the product from the signal. This information is then stored in data memory 24. In addition, either continuously or upon  
20 receipt of a signal, processing unit 28 causes low power display 22 to display the price and/or other product information according to both the data stored in data memory 24 and the instructions contained in program memory 26.

These components of shopping tag 10 may be implemented in a number of different ways. Various examples of these components are given below for the purposes of illustration only, it being understood that these examples are not intended to be limiting in any way.

5           For example, wireless transponder 16 and antenna 18 may collectively be implemented as a RFID (radio frequency identification) product, such as the Indala products (Motorola Inc., USA) for example. Each RFID product includes a combined wireless transponder with antenna, which is then read by a proximity reader. Such a RFID product may obtain energy from the  
10   received transmission, for example through a magnetic field generated by the proximity reader, which then causes an electrical current to form in the coil and capacitor of the RFID product. The electrical current provides power to a data processor chip, which in shopping tag 10 would be processing unit 28. Processing unit 28 causes the magnetic field to be modulated through  
15   wireless transponder 16, such that information is transmitted back to the proximity reader. Thus, the RFID product enables the presence of shopping tag 10 to be detected.

As another example, antenna 18 may be implemented as a BiStatix™ Smart Label (Motorola Inc., USA), which features conductive non-metallic  
20   ink (see for example "BiStatix Whitepaper", version 4.1, Motorola Inc., <http://www.mot.com/LMPS/Indala/bistatix.html> as of September 14, 1999, incorporated herein by reference only for the description of the BiStatix™ smart labels and of RFID products). The ink can be printed directly to a

printing medium, such as paper, thereby providing a more flexible implementation, and acts as an RFID antenna. The BiStatix™ smart label also features a data processor, corresponding to processing unit 28, and a transponder corresponding to wireless transponder 16, implemented as a single chip.

As yet another non-limiting example, low power display 22 and antenna 18 could be implemented in combination as the electronic ink Immedia product (E Ink Corp., USA). Upon receipt of a low power signal, the electronic ink changes conformation and hence the display. Alternatively and preferably, low power display 22 could be implemented as a LCD display.

Processing unit 28, program memory 26 and data memory 24 are preferably implemented as a single chip, for example as a programmable ASIC. Alternatively, these components could be implemented as a combination of a microprocessor for processing unit 28, and a non-volatile memory such as flash memory, ferro-electric memory and/or ferro-magnetic memory for program memory 26 and data memory 24.

Processing unit 28 optionally and preferably includes a wake-up timer which causes processing unit 28 to periodically check wireless transponder 16 for any received messages. Such a timer could be implemented as a real-time interrupt, for example. Alternatively, the energy received by wireless transponder 16 may be used for a wake-up signal by releasing a sleep line for processing unit 28. Once the wake-up signal has been received, a code

identification sequence is preferably started, for example in order to identify shopping tag 10 before new information is received. If the new broadcast information is not intended for that particular shopping tag 10, then preferably processing unit 28 powers down again.

- 5            Depending upon the power demands made by wireless transponder 16, antenna 18 and low power display 22, power source 20 may be implemented as a long life battery such as a lithium button cell. Optionally and preferably, power source 20 may also be implemented as a solar-cell array for receiving energy from the lighting in the store itself. In this
- 10   preferred embodiment, power source 20 may be automatically activated, hence activating low power display 22, when the customer turns shopping tag 10 in order to view the display by low power display 22. Alternatively, power source 20 may only store received energy from received transmissions, and may therefore serve only as a short-term power source.
- 15            Figure 2A shows a schematic diagram of the outward appearance of an exemplary shopping tag 10. As shown, shopping tag 10 features low power display 22, attachment mechanism 12 and locking mechanism 14 of Figure 1. In addition, the components of shopping tag 10 are contained within a housing 30, which may be plastic, metal, paper or any other suitable
- 20   material. Low power display 22 may optionally be activated by the customer through a switch 32. Low power display 22 then preferably automatically turns off after a certain period of time has elapsed, for example according to

instructions executed by processing unit 28 (not shown in Figure 2A, see Figure 1).

According to the preferred embodiment of attachment mechanism 12 and locking mechanism 14 shown, locking mechanism 14 causes attachment mechanism 12 to be clamped onto the product, inserted into the product, or otherwise attached to the product and then locked. Preferably, locking mechanism 14 features a lock release mechanism and a lock (not shown in Figure 2A, see Figure 2B). More preferably, the lock release mechanism is released automatically.

10 An example of a preferred embodiment of the lock release mechanism is shown in Figure 2B. As shown, locking mechanism 14 features a solenoid coil 27, which is attached to a switch 29. Switch 29 is in turn connected to a super-cap 31, which is trickle charged from power source 20 through a resistor to maintain a full charge on super-cap 31. Super-cap 31 is an  
15 example of a preferred large value, low voltage capacitor. Switch 29 is normally set to prevent the flow of electricity to solenoid coil 27. As long as energy does not flow through solenoid coil 27, the electro-magnet remains locked. When processing unit 28 sends the appropriate signal to switch 29, switch 29 causes the stored energy in super-cap 31 to be released through  
20 solenoid coil 27. The magnetic field generated by solenoid coil 27 moves the solenoid so as to release a lock release mechanism 33, thereby opening locking mechanism 14. Such a preferred embodiment of locking mechanism

14 obviates the need for manual release of attachment mechanism 12 and hence of shopping tag 10.

Figure 3 shows a schematic block diagram of an exemplary system according to the present invention. A system 34 features shopping ~~tag 10~~ as  
5 illustrated in Figures 1 and 2. Shopping tag 10 receives product information such as price information from a broadcast transceiver 36 which is attached to a central computer 38. Central computer 38 operates a software module  
40 for determining the product information to be transmitted to shopping tag 10. Such product information may optionally include, but is not limited to,  
10 the price of the product, the item code of the product, the group code of the product, the origin of the product, the brand of the product, the ingredients and/or construction of the product, or a combination of two or more of these items thereof. The price of the product may also optionally include the  
current price of the product, the previous price of the product and a discount  
15 on the price of the product.

Software module 40 preferably is able to determine the identity of each particular shopping tag 10 by receiving a unique code from shopping tag 10 through broadcast transceiver 36. Software module 40 then  
determines the correct product information to be transmitted according to the  
20 unique code. Alternatively, software module 40 may cause the information to be generally broadcast through broadcast transceiver 36, which therefore may optionally only act as a transmitter, prefaced with the unique code. As previously described with regard to Figure 1 below, only that particular



shopping tag 10 with the unique code would listen to the remainder of the transmission.

System 34 also allows the product information to be changed and updated as desired, even on an hourly or daily basis, simply by sending the appropriate information through broadcast transceiver 36. Furthermore, in addition to or in place of the price information, the product code and/or the group code may be changed. However, the unique code of shopping tag 10 is not changed in order to permit identification of shopping tag 10.

According to another preferred embodiment of the present invention, system 34 may optionally be used to simplify stock taking and control. Upon request, broadcast transceiver 36 may send an interrogatory signal to each shopping tag 10, which then responds when the unique code of that shopping tag 10 is transmitted. This information can be used to inventory how many units of a particular product are in stock, which further facilitates minimum stocking levels, automatic re-ordering of products and budgetary reporting. Again, such stock taking and control is performed substantially automatically by system 34, which reduces the amount of manual labor required of sales personnel.

When the customer wishes to purchase a product, sales personnel may optionally interrogate shopping tag 10 with a point-of-sales terminal 42. Terminal 42 then automatically displays price and optionally other information about the product. After the customer has arranged payment, terminal 42 optionally and preferably transmits a signal to shopping tag 10 to

cause the locking mechanism (not shown in Figure 3, see Figures 2A and 2B) to automatically release shopping tag 10 from the product.

System 34 also provides anti-theft functions as follows. As shown in Figure 3, system 34 features an anti-theft detector 44, which may be a  
5 proximity reader for example and which is easily selected by one of ordinary skill in the art according to the implementation of shopping tag 10. Anti-theft detector 44 sounds an alarm or otherwise gives an indication when shopping tag 10 passes out of a permitted area. Such a permitted area may be within the entire store, or optionally only within a portion of the store, for  
10 example within a particular department.

According to a particularly preferred embodiment of the present invention, the product information optionally may also include an advertisement, for the product itself, the brand associated with the product and/or for the store selling the product, for example. Such an advertisement  
15 may be selected by the software module operated by central computer 38 according to such criteria as the type of product, the department in which the product is found, whether a sales campaign is proceeding at the store, and even whether the manufacturer of the product has chosen to pay for such an advertisement. Since the customer must examine shopping tag 10 in order to  
20 determine the price of the product, the attention of the customer is clearly focused on shopping tag 10 for a certain period of time, at which point the advertisement may be displayed.

According to another preferred embodiment of the present invention, shopping tag 10 may be able to sense the proximity of a loyalty card (not shown) which is carried by the customer. Shopping tag 10 may therefore optionally and preferably display a special price just for that customer-  
5 according to information contained on the loyalty card and/or according to the presence of the loyalty card. The loyalty card may be implemented as a contact-less smart card, for example.

According to still another preferred embodiment of the present invention, system 34 enables the instructions for operation which are stored  
10 on shopping tag 10 to be automatically updated and/or changed as necessary. Software module 40 optionally causes broadcast transceiver 36 to transmit new instructions as a flash reinstallation, which are then received and installed by shopping tag 10.

15 While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made.

## WHAT IS CLAIMED IS:

1. An anti-theft shopping tag device for indicating a presence of a product and for displaying information about the product, wherein the shopping tag device features:

- (a) an attachment mechanism for attaching to the product;
- (b) an antenna for sending a signal indicating the presence of the product; and
- (c) a processing unit for controlling said antenna;

the improvement comprising:

- (d) a low power display for displaying the product information, said low power display being controlled by said processing unit.

2. The shopping tag device of claim 1, further comprising:

- (e) a wireless transponder for processing said signal for transmission by said antenna and for receiving and processing a received signal through said antenna, said wireless transponder being controlled by said processing unit, the product information being received from said received signal.

3. The shopping tag device of claim 2, wherein said antenna and said wireless transponder are embodied in combination as a RFID (radiofrequency identification) product.

4. The shopping tag device of claim 3, wherein said antenna and said wireless transponder receive power from said received signal.

5. The shopping tag device of claim 2, wherein said antenna is a conductive non-metallic ink.

6. The shopping tag device of claim 5, wherein said antenna, said wireless transponder and said processing unit are embodied in combination as a BiStatix™ Smart Label.

7. The shopping tag device of claim 1, wherein said low power display is selected from the group consisting of an LCD display and electronic ink.

8. The shopping tag device of claim 1, further comprising:  
(g) a program memory for storing a plurality of instructions for operating said antenna, said wireless transponder and said low power display, said processing unit reading said plurality of instructions from said program memory.

9. The shopping tag device of claim 8, further comprising:

- (h) a data memory for storing the product information for display by said low power display, said processing unit reading the product information from said data memory.

10. The shopping tag device of claim 9, wherein said processing unit, said data memory and said program memory are implemented as a programmable ASIC.

11. The shopping tag device of claim 9, wherein said processing unit is a microprocessor, and said data memory and said program memory are each implemented as a non-volatile memory selected from the group consisting of a flash memory, a ferro-electric memory and a ferro-magnetic memory.

12. The shopping tag device of claim 9, wherein said processing unit features a real-time interrupt for waking up to receive a message from said wireless transponder.

13. The shopping tag device of claim 1, wherein said attachment mechanism further comprises a locking mechanism for locking said attachment mechanism to the product.

14. The shopping tag device of claim 13, wherein said locking mechanism automatically unlocks upon receipt of an unlocking signal by said antenna.

15. The shopping tag device of claim 14, wherein said locking mechanism comprises:

- (i) an electro-magnetic lock;
- (ii) a capacitor for storing electricity and for releasing said electricity upon receipt of said unlocking signal; and
- (iii) a solenoid for receiving said electricity and for releasing said electro-magnetic lock.

16. The shopping tag device of claim 1, wherein said low power display is activated by a customer, the shopping tag device further comprising:

- (i) a switch for switching on said low power display by said customer.

17. An anti-theft system for a product in a store, the system characterized by:

- (a) an anti-theft shopping tag for indicating a presence of a product and for displaying information about the product, comprising:
  - (i) an attachment mechanism for attaching to the product;

- (ii) an antenna for sending a signal indicating the presence of the product and for receiving a received signal containing said information about the product;
  - (iii) a low power display for displaying the product information; and
  - (iv) a processing unit for controlling said antenna and said low power display;
- (b) an anti-theft detector for detecting the presence of said shopping tag device and for sounding an alarm;
  - (c) a computer for determining at least said information about the product; and
  - (d) a broadcast transmitter for transmitting at least said information about the product from said computer to said antenna of said shopping tag device.

18. The anti-theft system of claim 17, wherein said information about the product includes a price of the product.

19. The anti-theft system of claim 17, wherein said information about the product further includes information selected from the group consisting of an item code, a group code, a brand of the product, an origin of the product, materials of the product and construction of the product, and a combination thereof.



20. The anti-theft system of claim 17, wherein said shopping tag device further comprises:

- (v) a data memory for storing said product information for display by said low power display, said processing unit reading said product information from said data memory.

21. The anti-theft system of claim 20, wherein said data memory stores a unique code for identifying said shopping tag device, such that said shopping tag device only listens to a transmission from said broadcast transmitted prefaced with said unique code.

22. The anti-theft system of claim 17, further comprising a broadcast receiver for receiving an inventory signal from said antenna of said shopping tag device, said shopping tag device transmitting said inventory signal upon receipt of an interrogatory signal from said broadcast transmitter, said inventory signal identifying the product attached to said shopping tag device.

23. The anti-theft system of claim 17, wherein said shopping tag device further comprises:

- (v) a locking mechanism for locking said attachment mechanism to the product.

24. The anti-theft system of claim 23, further comprising:
- (e) a point-of-sales terminal for receiving information about a price of the product from said shopping tag device.

25. The anti-theft system of claim 24, wherein said point-of-sales terminal additionally sends a signal to said shopping tag device for unlocking said locking mechanism.

26. A price display system for a product in a store, the system characterized by:

- (a) a shopping tag for displaying information about the product, comprising:
  - (i) an attachment mechanism for attaching to the product;
  - (ii) an antenna for receiving a received signal containing said information about the product;
  - (iii) a low power display for displaying the product information; and
  - (iv) a processing unit for controlling said antenna and said low power display;
- (b) a computer for determining at least said information about the product; and

- (c) a broadcast transmitter for transmitting at least said information about the product from said computer to said antenna of said shopping tag device.

27. A method for providing anti-theft protection for a product by an anti-theft detector and for displaying at least a price of a product with a single unit shopping tag device, the shopping tag device featuring a microprocessor, the method characterized by the steps of:

- (a) receiving at least the price of the product by the shopping tag device;
- (b) displaying at least the price of the product by the shopping tag device;
- (c) detecting a presence of the shopping tag device by the anti-theft detector;
- (d) sounding an alarm by the anti-theft detector; and
- (e) changing at least the price of the product by sending a new price to the shopping tag device, such the said new price is displayed automatically by said shopping tag device.

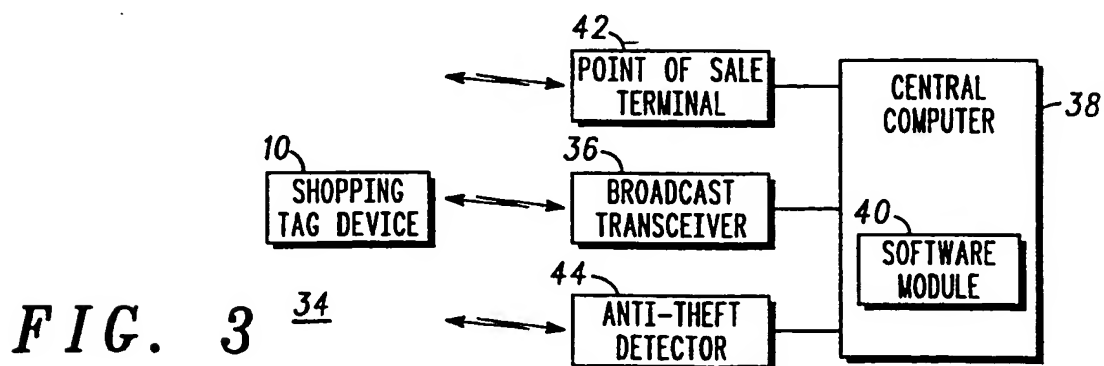
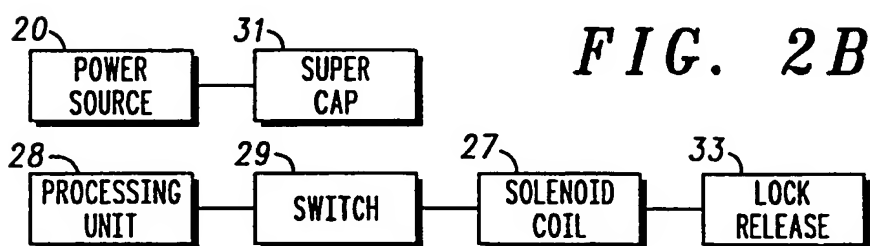
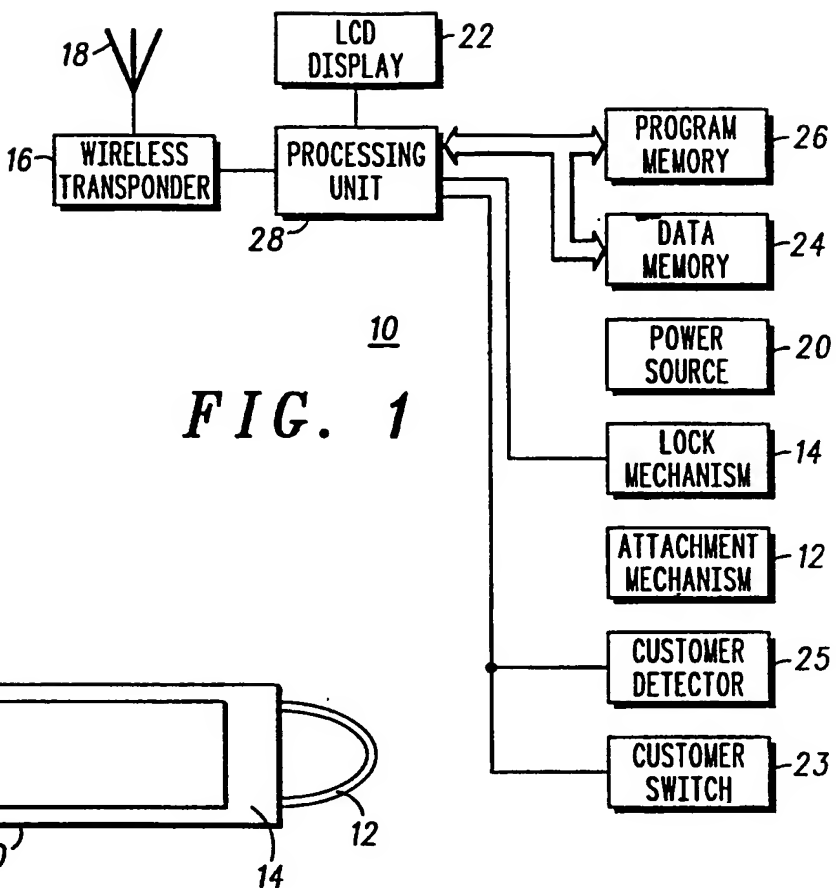
28. The method of claim 27, further comprising the step, performed before step (a), of transmitting at least the price of the product by a remote transmitter.

29. The method of claim 28, wherein said remote transmitter also transmits an advertisement, such that step (a) further comprises the step of receiving said advertisement, and step (b) further comprises the step of displaying said advertisement.

30. The method of claim 28, wherein step (e) further comprises the steps of:

- (i) detecting a presence of a specific customer, and
- (ii) changing the price to said new price according to said presence of said specific customer.

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 00/01977

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G08B13/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G08B H01Q G06K G07G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 151 684 A (JOHNSEN EDWARD L) 29 September 1992 (1992-09-29)	1-4,8,9, 12-15, 17-29
Y	figure 1  column 1, line 5-15 column 2, line 55-70 column 3, line 1-45 column 5, line 40-70 column 6, line 5-15,30-50 column 7, line 35-55 column 10, line 45-70 column 12, line 25-35 --- -/--	5-7,10, 11



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

### \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
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- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*G\* document member of the same patent family

Date of the actual completion of the international search

11 April 2001

Date of mailing of the international search report

23/04/2001

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 00/01977

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 98 40930 A (PRECISION DYNAMICS CORP) 17 September 1998 (1998-09-17) page 2, line 10-25 page 5, line 1-10 page 7, line 15-25 ----	5-7
Y	DE 196 28 803 A (TELESENSOMATIC GMBH) 22 January 1998 (1998-01-22) column 2, line 5-40 ----	10
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Information on patent family members

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US 5963133 A	05-10-1999	NONE	